UNIVERSITY OF TORONTO

THE PROVINCIAL UNIVERSITY OF ONTARIO

UNIVERSITY EXTENSION

TWO-YEAR COURSE

IN

AERIAL NAVIGATION

TORONTO
ONTARIO, CANADA

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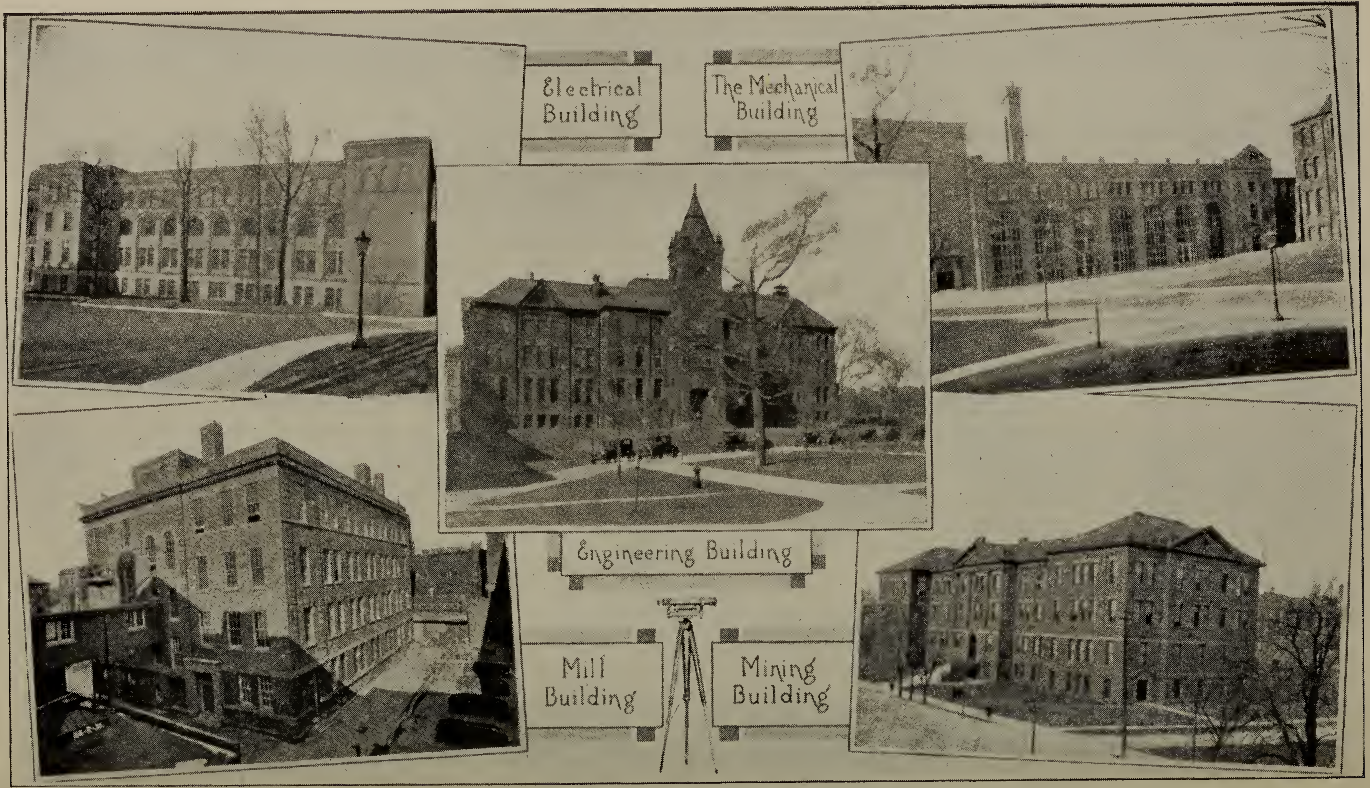
May 31st, 1941.



Science Buildings

ADMINISTRATIVE OFFICERS

THE UNIVERSITY

President	THE HON. AND REV. H. J. CODY, M.A., D.D., LL.D., F.R.S.C.
Registrar	A. B. FENNELL, M.C., M.A.
Bursar	C. E. HIGGINBOTTOM
Librarian	W. S. WALLACE, M.A., F.R.S.C.
Director, University Extension and Publicity	W. J. DUNLOP, B.A., B.PAED.
Superintendent of Buildings and Grounds	A. D. LEPAN, B.A.SC.
Warden of Hart House	J. B. BICKERSTETH, M.C., M.A.
Director of University Health Service	G. D. PORTER, M.B.
Medical Adviser for Women Students	MISS J. F. DAVEY, B.A., M.D.
Manager of the University of Toronto Press	A. G. BURNS, B.A.

COURSE IN AERIAL NAVIGATION

OFFICERS OF INSTRUCTION

E. F. BURTON, B.A. Tor., Camb., Ph.D., F.R.S.C., *Professor of Physics and Head of the McLennan Laboratory.*

F. S. HOGG, B.A., A.M., Ph.D. Harv., *Assistant Professor of Astronomy.*

A. PITT, B.A. Houghton, *Assistant Professor of Physics.*

J. M. ANDERSON, M.A., Ph.D., *Demonstrator and Lecturer in the Department of Physics.*

J. R. COCKBURN, M.C., B.A.Sc. M.E.I.C., *Professor of Descriptive Geometry.*

J. W. MELSON, B.A.Sc., *Associate Professor of Civil Engineering.*

T. R. LOUDON, B.A.Sc., M.E.I.C., *Professor of Applied Mechanics.*

M. J. C. LAZIER, B.A.Sc., *Lecturer in Applied Mechanics.*

R. B. MCINTYRE, B.A.Sc., B.A. Camb., *Lecturer in Applied Mechanics.*

J. G. BRECKENRIDGE, B.A.Sc., Ph.D., *Lecturer in Chemical Engineering.*

F. J. BLAIR, B.A.Sc., *Toronto Harbour Commission.*

WING-COMMANDER D. G. JOY, *Department of Transport, Canada*

Members of the Staff of the Dominion Meteorological Bureau.

All enquiries and correspondence regarding these courses must be addressed to W. J. Dunlop, Director, University Extension, University of Toronto, Toronto, Ontario. Application forms will be promptly sent on request. Personal applications are highly desirable.

DIPLOMA COURSE IN AERIAL NAVIGATION FOR THE TRAINING OF PILOTS AND OPERATORS

The University of Toronto organized the Course in
Aerial Navigation in 1938.

I. **This course provides instruction in the fundamental sciences including Mechanics, Applied Physics, and Chemistry necessary to lead to qualifying examinations for**

(1) Commercial and Transport Pilots.

(2) Navigators.

(3) Despatchers including Control Tower Operators.

(4) Operating Meteorologists as assistants to Despatchers.

(5) Radio Operators for Communication and Direction-Finding.

II. DURATION OF COURSE—two academic years (October 1st to March 31st).

III. ADMISSION REQUIREMENTS: A candidate for admission to the First Year of this course must have completed the eighteenth year of his age on or before the first of October of the year in which he applies for admission. He must also submit his application for admission, on the form provided, to the Director of University Extension at as early a date as possible, and not later than September 10th, together with a certificate of good character, a certificate of successful vaccination, the Ontario Secondary School Graduation* Diploma and the Ontario Grade XIII certificate, or equivalent certificates, showing that he has completed satisfactorily and obtained the required standing in the following subjects:

**In either the General Course or the Vocational Course (Technical Option).*

SECONDARY SCHOOL GRADUATION DIPLOMA

No subjects are definitely prescribed;

GRADE XIII

ENGLISH
MATHEMATICS (Algebra, Geometry, Trigonometry)
SCIENCE (Chemistry and Physics)
One of FRENCH
    GERMAN
    GREEK
    ITALIAN
    LATIN
    SPANISH

IV. APPLICANTS MUST BE BRITISH SUBJECTS. They must comply with the physical standards set by the Department of Transport of the Government of Canada for pilot's rating. This will involve a medical examination, before commencing the work of each year, by a physician appointed by the Department of Transport. Each student should obtain at least a private pilot's certificate as soon as he can possibly arrange to do so.

V. FEES. Notice is hereby given that, commencing with the session 1942-1943, each student will be required to pay at least the first term instalment of fees on or before the opening date of the session and before he can receive his card of admission to lectures from the Director of University Extension.

The office of the University Bursar in Simcoe Hall is open from 9 a.m. to 1 p.m. daily, except Saturday, for the receipt of fees; these fees may also be forwarded by mail, if accompanied by a letter giving the full name, course, and year of the student. Cheques should be made payable to the University of Toronto.

All fees due in the first term are payable in full on or before October 15th, and all fees due in the second term, on or before January 15th. After these dates a deferred payment fee of $1.00 a month will be imposed in each term until the whole amount is paid.

Any student who has not paid in full the fees due in the first term will not be allowed to proceed with the work of the second term.

Each student enrolled in the course in Aerial Navigation must pay annual fees according to the schedule below; the total fee in each case is made up of the academic fee and incidental fees; all incidental fees are payable in the first term.

SCHEDULE OF FEES

Academic Year	*Academic Fee	†Incidental Fees	Total Fee (if paid in one instalment)	First Term Instalment	Second Term Instalment
First and Second ..	$175	$27	$202	$115	$88

OTHER UNIVERSITY FEES

Each student is required to pay to the University Bursar at the opening of the session, or as otherwise specified, such of the following fees as may be required of him.

Equivalent certificate fee....................	$5

Each student who has been admitted to the First Year upon a certificate or certificates granted outside the Province of Ontario and covering all or any part of the admission requirements must pay this fee.

Advanced standing fee......................	$10

Each student who has been admitted to advanced standing from another university or college must pay this fee.

Supplemental Examination fee................	$10

Each student who applies to write a supplemental examination must pay this fee.

Diploma fee...............................	$5

Each candidate for the diploma in Aerial Navigation must pay this fee on or before January 15th of his final year.

VI. All students will be on probation during the first term.

VII. Applications, on the form supplied, must be made to the

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*The Academic Fee includes the following fees:—Tuition; Library; Laboratory Supply; and one Annual Examination.

†These Incidental Fees include the following fees:—Hart House; Students' Administrative Council; Athletic; Health Service; and Undergraduate Association.

Director of University Extension, University of Toronto, on or before September 10th of each year. It will be necessary to limit the number of students, in each year, to approximately twenty-five.

VIII. To graduates in any of the courses in Applied Science and Engineering and to graduates in Arts, in the Honour Course in Mathematics and Physics, and Physics and Chemistry, exemption may be allowed for subjects taken in undergraduate courses in so far as such subjects correspond in content with the subjects listed above.

IX. On successful completion of the course (with standing of fifty per cent. or over in each subject) a diploma will be awarded.

X. A student in the First Year, who obtains standing (fifty per cent. or more) at the March examinations in all subjects except one or two, may write supplemental examinations in September in the subject or subjects in which he was not successful. If he fails to obtain standing in one or both of these subjects in September he cannot be admitted to the Second Year. If he wishes, under the circumstances, to continue the course, he must repeat the work of the First Year.

XI. UNIVERSITY HEALTH SERVICE. The University Health Service, for both men and women students, conducts the medical examination of each student to determine his physical condition. Should the findings at the initial examination reveal any condition which requires the opinion of a specialist, the student will be examined by a consultant. Should the examination disclose evidence of a condition for which medical treatment is indicated, the student will be advised to consult his family physician or other doctor of his own choice. Should the examination reveal any postural defect or other condition for which special exercises are considered advisable, arrangements for them will be made by co-operation between the Health Service and the Director of Physical Education.

Any student may consult the University Health Service for medical advice during stated hours. Any student who has a minor ailment, or who is taken ill, or is injured on the University grounds or premises, or who is injured during University athletic games or sports, will be given advice, and, if necessary, first aid treatment.

The University Health Service will give a course of lectures to students annually on the maintenance and promotion of health and the prevention of disease.

XII. Courses of Instruction and Lectures—First Year:

1. **Dynamics:** A course in Kinematics in which the theory of relative velocity is thoroughly gone into in order to give the student a basic training in those principles necessary for a proper understanding of the theory of flight and navigation problems. The course will also go into the fundamental principles of the relations which exist between force and matter. A detailed discussion of energy, work and power will also be given. Text-book: *Analytical Mechanics for Engineers* by Seeley and Ensign. 2 hours per week.

2. **Statics:** This course will deal with the fundamental laws of the equilibrium of forces and will be extended to the practical application in determining stresses in simple framed structures. The course will also include some discussion beyond the usual scope of Statics dealing with problems of Mechanics of Materials in which appear the fundamental relations of the resistance of materials. Text-book: *Analytical Mechanics for Engineers* by Seeley and Ensign. 2 hours per week.

3. **Physics:** This course includes Electricity and Magnetism. which will give the student a grasp of the fundamental principles of electrical phenomena and a laboratory course of instruction will also be provided; Elementary Radio, which will give the student a grounding in the principles of Radio Communication; and Heat and Elementary Thermodynamics, which will deal with the basic laws of heat energy and the applications of these laws in practice. Thorough consideration will be given to the basic theory of the heat engine so that the student will be properly trained in theory before practical operation of engines and thermal equipment is attempted.

4. **Spherical Trigonometry and Avigation 1:** The lectures of this course extend the principles of trigonometry to those of spherical triangles. Sufficient instruction is given to enable the student to understand certain navigation problems later on in the course. 1 hour a week.

5. **Descriptive Geometry:** The training in this course of lectures and practical problems is necessary to develop the imagination to read plans and to understand the principles of map construction. 2 hours a week.

6. **Chemistry:** This course in general chemistry will enable

the student to understand the constitution of the various aviation products in use, such as gasoline and lubricating oils, and will also give a fundamental training for the proper understanding of certain other phases of the operation of aircraft such as composition of exhaust gases, etc. 2 hours a week.

7. METEOROLOGY: A thorough training will be provided in the elementary principles of weather-map construction for forecasting weather conditions. This course will also deal with cloud formations and certain weather conditions which an aviator must recognize in order to avoid trouble. The training will include actual laboratory work under the supervision of the Dominion Meteorological Service. 1 hour lecture and 4 hours laboratory a week.

8. ASTRONOMY: The lectures of this course are more or less descriptive and will enable the student to understand certain phases of the navigation work of the second year. 2 hours a week.

9. AIRLINE OPERATIONS: The course deals with the principles underlying air transportation business and operation. Airport equipment will also be discussed. 17 hours distributed through the whole term.

10. AIR REGULATIONS: A short course of lectures dealing with the regulations under which Canadian and International air traffic is conducted.

11. AIR CRAFT ENGINES: A descriptive course of the aircraft engine and its accessories. 1 hour a week.

12. AIR CRAFT INSTRUMENTS: A short descriptive course of the various instruments used in modern flights. 1 hour a week.

13. ELEMENTARY THEORY OF FLIGHT: This course outlines the elementary aerodynamic principles involved in flight. The functions of the different parts of an airplane and its controls are also discussed. Text-book: *Technical Aerodynamics* by K. D. Wood. 1 hour a week.

14. CONVERSATIONAL FRENCH: 2 hours a week.

SECOND YEAR

1. MECHANICS OF MATERIALS: This course deals with the fundamental theories of stress and strain, as applied to the design

of simple tension and compression members and material subjected to bending. Text-book: *Strength of Materials* by Poormon. 2 hours a week.

2. THEORY OF FLIGHT: The work of the first year is elaborated in these lectures and the question of stability and performance dealt with in a number of practical problems. 1 hour a week.

3. AIRPORT LAYOUT AND EQUIPMENT: The factors governing the choice of airport location, the methods of construction and the equipment requirements are gone into in this course of lectures. There will also be inspection trips to local airports during the year. 1 hour a week.

4. AIR PILOTAGE: This course deals with the practical application of dead reckoning methods and the use of instruments in finding one's way to a given destination. In this course, practical instruction on a Link Trainer will be given. Text-book: *Air Navigation* by Weems.

5. ADMINISTRATION AND ACCOUNTING: This is a lecture course on the underlying principles of accounting and general business methods. 1 hour a week.

6. AIRLINE OPERATIONS: These lectures are a continuation of the First Year course dealing with general operations methods of air transport business. Number of hours a week to be announced later.

7. AIR CRAFT ENGINES: This is largely a laboratory course during which aircraft engines are dismantled and assembled in order to give the students some practical familiarity with motive power. 3½ hours a week.

8. INSTRUMENTS: The work of the First Year is continued in this course by practical assembly of dismantled instruments in order to give the student familiarity with the construction of aircraft instruments. 3 hours a week.

9. CELESTIAL AVIGATION: A course of lectures with day and night observations by Bubble Sextant, Transit, Compass, etc., for Line of Position, Latitude, Longitude, Time, Azimuth and Star Identification, and the consequent calculation and plotting. Plain, Mid-Latitude Mercator and Great-circle Sailing is included.

10. COMMUNICATION (CODE): In this course the student is instructed in the operation of code apparatus. The students will be

allowed sufficient time to learn to read and transmit messages by signal code. Instructor and time to be announced.

11. RADIO: Instruction will be given in this course on aircraft radio apparatus so as to familiarize the student with present day methods of radio communication and direction finding. Text-book: *Fundamentals of Radio* by F. E. Terman. 8 hours a week.

12. METEOROLOGY: This course is a practical continuation of the First Year work to give the student greater familiarity with the principles already learned. 1½ hours a week.

13. AIRPORT OPERATIONS (DESPATCHING, etc.): Arrangements will be made in this course for students to visit existing airports and observe the methods used in operating and despatching under actual practical conditions. 3 hours a week.

Applications should be sent to the Director of University Extension, University of Toronto. On or before September 15th, a letter will be sent to each applicant stating whether or not his application has been accepted and whether or not the course is to be given.

This course opens on the first day of October. Those whose applications have been accepted will register with the Director of University Extension in Room 232, Simcoe Hall, on the preceding day.

Simcoe Hall